

REMARKS

This application has been reviewed in light of the Office Action dated March 16, 2004. Claims 1-15 are presented for examination, of which Claims 1, 6, and 11, the independent claims, have been amended to define still more clearly what Applicant regards as his invention. Favorable reconsideration is requested.

Claims 1, 2, 4-7, 9-12, 14 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,100,998 (*Nagao et al.*) and U.S. Patent No. 5,768,489 (*Adachi et al.*), and Claims 3, 8, and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nagao et al.*, *Adachi et al.* and U.S. Patent No. 6,559,971 (*Watts et al.*).

As shown above, Applicant has amended independent Claims 1, 6, and 11 in terms that more clearly define what he regards as his invention. Applicant submits that these amended independent claims, together with the remaining claims dependent thereon, are patentably distinct from the cited prior art for at least the following reasons.

The present invention is directed to providing printing control which can optimally schedule expansion processing in plural expansion processing means. In conventional systems, as described in detail in the specification, to overcome the problem of printing overrun, conventional systems employ a technique that causes the transfer wait time to become increasingly longer, thereby decreasing the performance of a printer.

The aspects of the present invention respectively set out in independent Claims 1, 6, and 11 address the foregoing problem by decreasing the number of pre-rendering processes as compared to the conventional technique discussed in the specification.

The aspect of the present invention set forth in Claim 1 is a printing control apparatus. The apparatus includes plural expansion processing means, calculation means, and scheduling processing means. The plural expansion processing means expands printing data of a predetermined format to image data of a format to be output to a printer, where the output to the printer is performed on a segment basis. The calculation means calculates, before the expansion processing is performed by the plural expansion processing means, a processing time necessary to expand the printing data to the image data for each segment. The scheduling processing means schedules the expansion processing for each segment by the plural expansion processing means, based on the processing time calculated by the calculation means. Each of the plural expansion processing means has band raster memory areas, independent of the other plural expansion processing means, to hold output images, and the scheduling processing means checks a plurality of schedule patterns obtained by assigning each segment to each band raster memory area, specifies one of the plurality of schedule patterns that has the smallest number of temporary band rasters, and schedules which segments each of the plural expansion processing means are to perform the expansion process on.

Among other important features of Claim 1 is the scheduling processing means checking a plurality of schedule patterns obtained by assigning each segment to each band raster memory area, specifying one of the plurality of schedule patterns that has the smallest number of temporary band rasters, and scheduling which segments should each of the plural expansion processing means perform the expansion process on. In the example shown in Figure 18 and the flow chart depicted in Figure 11, the scheduling processing means checks a plurality of schedule patterns (TSL1-TSL5), specifies one schedule pattern

with the smallest number of temporary band rasters (TBN), and schedules which segments (bands) should each expansion processing means perform the expansion process on.¹

Nagao et al. relates to a print processor that utilizes a page printer. *Nagao et al.* merely discusses that intermediate data of which the data structure is highly abstract is generated based on input print data. Further an expansion time is estimated based on the number of basic figures constituting the intermediate data and the sizes thereof. The image output speed of an image output means in *Nagao et al.* is determined based on the estimated expansion time.

As correctly stated at page 3 of the Office Action, *Nagao et al.* does not teach the plural expansion processing means and that the scheduling means schedules which segments should each of the plural expansion processing means perform the expansion processing on. Further, nothing has been found in *Nagao et al.* that would teach or suggest the scheduling means checking a plurality of schedule patterns obtained by assigning each segment to each band raster memory area, and specifying one of the plurality of schedule patterns that has the smallest number of temporary band rasters.

For at least the above reasons, Applicant submits that Claim 1 is clearly patentable over *Nagao et al.*, taken alone.

The Office Action cites *Adachi et al.* as remedying the deficiencies of *Nagao et al.*, and in particular, teaching plural expansion processing means and wherein the scheduling processing means schedules which segments should each of the plural expansion processing means perform the expansion process on. *Adachi et al.* relates to producing a printed output by processing print information described in print languages,

¹/It is to be understood, of course, that the claim scope is not limited by the details of the described embodiments, which are referred to only to facilitate explanation.

such as page-description languages, using a plurality of image forming units. *Adachi et al.* discusses a plurality of arithmetic processing units, determining the order of processing of a plurality of drawing contents whose drawing results overlap each other on a print page, and allocating the drawing contents to the plurality of arithmetic processing units on the basis of the determined processing order (column 3, lines 6-13). However, nothing has been found in *Adachi et al.* that would teach or suggest scheduling processing means checking a plurality of schedule patterns obtained by assigning each segment to each band raster memory area, specifying one of the plurality of schedule patterns that has the smallest number of temporary band rasters, and scheduling which segments should each of the plural expansion processing means perform the expansion process on, as recited in Claim 1.

Applicant submits that a combination of *Nagao et al.* and *Adachi et al.*, assuming such combination would even be permissible, would fail to teach or suggest the scheduling processing means of Claim 1.

Accordingly, Applicants submit that Claim 1 is clearly patentable over the cited art.

Independent Claims 6 and 11 are method and storage medium claims, respectively, corresponding to apparatus Claim 1, and are believed to be patentable for at least the same reasons as discussed above in connection with Claim 1.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,


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